NO_X PROGRAM

Instead of using allowance trading to facilitate emissions reductions, the Title IV NO_x program establishes standard emission limitations for affected units. Title IV of the 1990 Clean Air Act Amendments required EPA to establish NO_x annual average emission limits (in pounds of NO_x per million British thermal units of fuel consumed (lb/mmBtu)) for coal-fired electric utility units in two phases.

In April 1995, EPA promulgated 40 CFR Part 76 which established NO_x emission limits beginning on January 1, 1996 for Group 1 boilers that were also part of the Phase I SO_2 program. (Group 1 boilers are dry bottom, wall-fired boilers and tangentially-fired boilers.) Phase I dry bottom wall-fired boilers are subject to a NO_x emission limit of 0.50 lb/mmBtu; Phase I tangentially-fired boilers are subject to a NO_x emission limit of 0.45 lb/mmBtu.

In addition, the April 1995 regulations allowed Phase II Group 1 units to use an "Early Election" Compliance Option. Under this regulatory provision, Group 1, Phase II NOx affected units can demonstrate compliance with the higher Phase I limits for their boiler type from 1997 through 2007 and not meet the more stringent Phase II limits until 2008. If the utility fails to meet this annual limit for the boiler during any year, the unit is subject to the more stringent Phase II limit for Group 1 boilers beginning in 2000, or the year following the exceedance, whichever is later.

In December 1996, EPA revised the NO_x emission limits for Phase II, Group 1 boilers (0.46 lb/mmBtu for dry bottom wall-fired boilers and 0.40 lb/mmBtu for tangentially-fired boilers) and established emission limits for cell burner, cyclones, wet bottom and vertically-fired boilers (referred to as "Group 2 boilers") effective on January 1, 2000. As a result of the April 1995 and December 1996 rulemakings, NO_x reductions were projected to be approximately 400,000 tons per year in 1996 through 1999 (Phase I), and 2,060,000 tons per year in 2000 and subsequent years (Phase II).

PHASE I NO_X UNITS

265 Phase I Units Were Subject to Emission Limitations in 1998

In 1998, 265 coal-fired utility units were subject to the Title IV Phase I emission limitations for NO_x.[1] The 265 Phase I NO_x affected units include 171 Table 1 units and 94 substitution units whose owners chose to participate in Phase I as part of an SO_2 compliance strategy. This group of units is subject to the Phase I emission limitations throughout Phase I and Phase II. Exhibit 7 shows the number of Phase I NO_x affected units by boiler type.

[1] Compared with 1997, the universe of units remained the same, except that Mt. Storm Unit 2 (WV) was added because its compliance extension expired and Gadsby Unit 3 (UT) was deleted because it was mistakenly identified in previous years as a coal-fired utility unit.

Exhibit 7
Phase I NO_x Units by Boiler Type

Boiler Type	Standard Emission Limit	Table 1 Units	Substitution Units	All Units
Tangentially-fired Boilers	0.45	94	41	135
Dry Bottom Wall-fired Boilers	0.50	77	53	130

Phase I NO_x Compliance Options

For each Phase I NO_x affected unit, a utility can comply with the applicable standard emission limitation, or may qualify for one of two additional compliance options which add flexibility to the rate-based compliance requirements:

- **Emissions Averaging**. A utility can meet the standard emission limitation by averaging the heat-input weighted annual emission rates of two or more units.

- **Alternative Emission Limitation (AEL)**. A utility can petition for a less stringent alternative emission limitation if it uses properly installed and operated low NO_x burner technology (LNBT) designed to meet the standard limit, but is unable to achieve that limit. EPA determines whether an AEL is warranted based on analyses of emissions data and information about the NO_x control equipment.

Exhibit 8 summarizes the compliance options chosen by Phase I affected NO_x units for 1998. As in 1996 and 1997, averaging was the most widely chosen compliance option. For 1998, there were 24 averaging plans involving 204 Phase I NO_x units. See Appendix C-1: List of Averaging Plans and Results in 1998.

Exhibit 8
Compliance Options Chosen in 1998

Compliance Option	Number of Units
Compliance with Standard Emission Limitation	51
Emissions Averaging	204
Alternative Emission Limitation	10
TOTAL	265

PHASE I NOX COMPLIANCE RESULTS

For 1998, EPA has determined that all 265 Phase I NO_x units met the required emission limit through compliance with either the standard emission limitation, emissions averaging, or an alternative emission limitation. See Appendix C-2: Compliance Results for the 265 NO_x Affected Units. For a more detailed description of EPA's methodology for determining compliance with Phase I NO_x limits, see Appendix C-4 in the Acid Rain Program 1996 Compliance Report.

NO_x Emission Rate Reduction

From 1990[2] to 1998, the average NO_x emission rate of the 265 Phase I units declined by 41% (from 0.70 lb/mmBtu to 0.41 lb/mmBtu). As shown in Exhibit 9, on average, both Table 1 and substitution units were below the average Phase I emission limit of 0.49 lb/mmBtu (the heat input weighted average of the applicable limits).

NO_x Mass Emissions Reduction

Exhibit 10 illustrates the change in NO_x mass emissions since 1990 for Table 1 and substitution units. For the 265 units, total NO_x mass emissions in 1998 were 29 percent lower than in 1990, but 3 percent higher than in 1997. While this is the second year total NO_x mass emissions have increased, the ascent can be attributed in part to greater electrical production, as evidenced by an increase in heat input in 1997 and 1998 of 3 percent and 6 percent, respectively, compared to 1996. Without further reductions in emissions rates, NO_x emissions would be expected to rise with increased utilization.

[2] For a more detailed description of the 1990 baseline refer to the Acid Rain Program 1996 Compliance Report.

Exhibit 9
Average NO_x Emission Rates for 265 Phase 1 Units

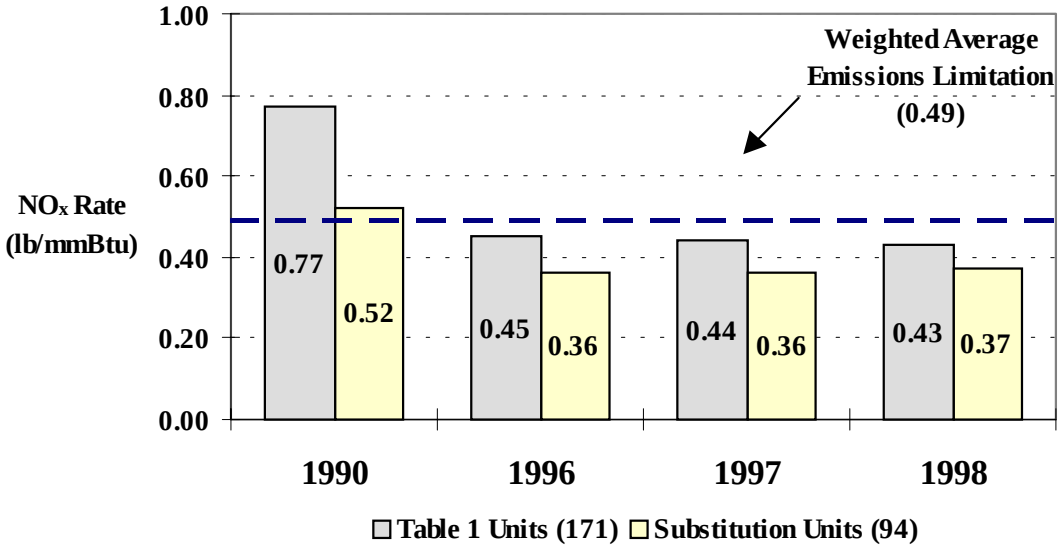
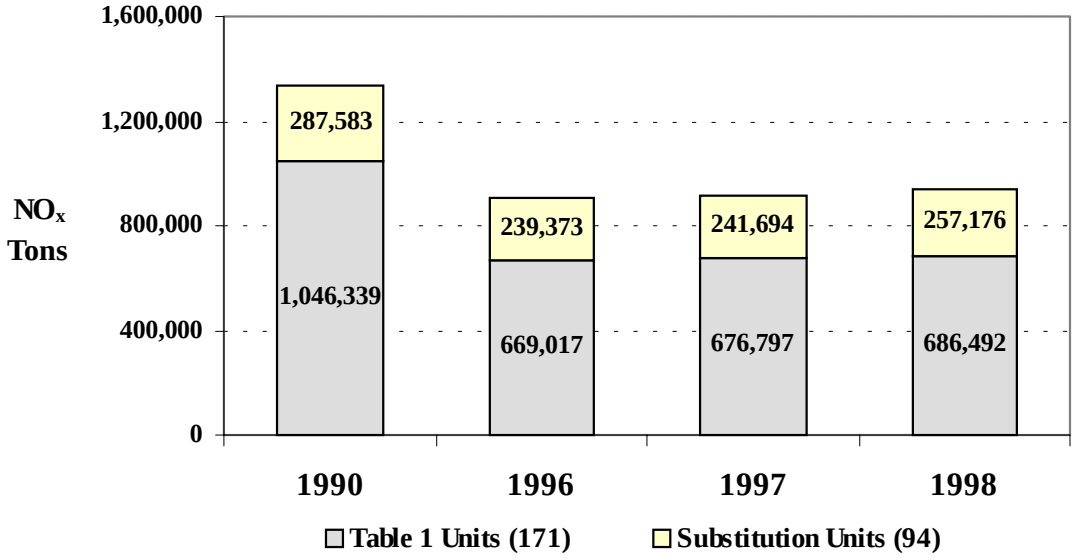


Exhibit 10
NO_x Mass Emissions for 265 Phase I Units



PHASE II EARLY ELECTION UNITS

275 Units Were Subject to Early Election Requirements in 1998

Nineteen ninety-eight was the second year in which early election utility units were required to

meet the Phase I NO_x limit[3]. Exhibit 11 shows the number of Early Election units by boiler type and their corresponding emission limit.

Exhibit 11
Distribution of 1998 Early Election Units by Boiler Type

Boiler Type	Standard Emission Limit	Operating Group 1, Phase 2 Units	Early Election Units	Percent of Units Electing
Tangentially-fired	0.45	300	171	57%
Dry Bottom Wall-fired	0.50	314	104	33%
Total		614	275	45%

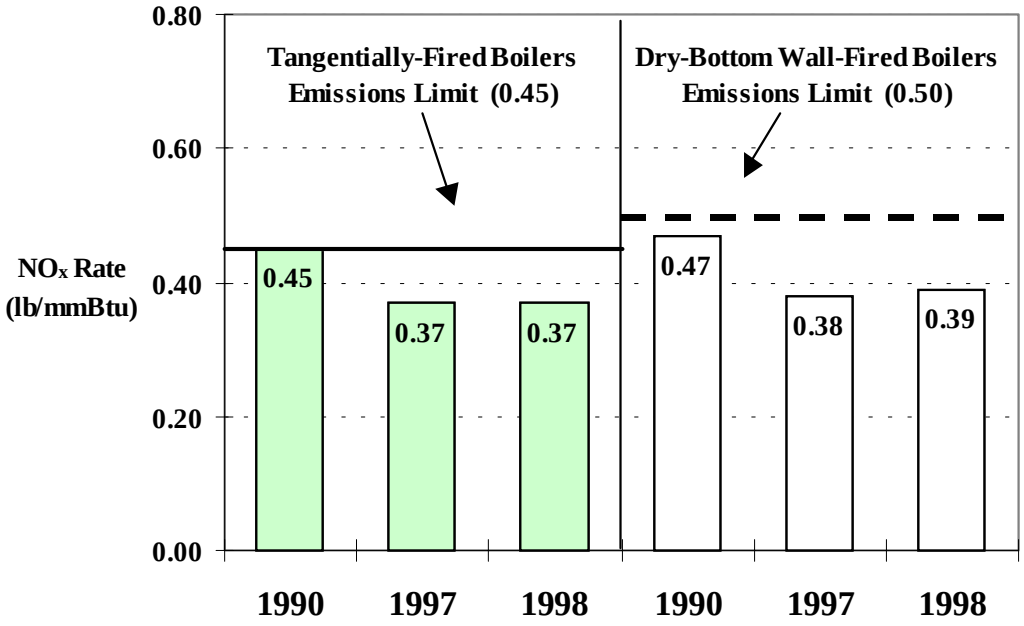
EARLY ELECTION COMPLIANCE RESULTS

For 1998, EPA determined that all 275 units complied with the Phase I, Group 1 emission limitations and have continued eligibility for Early Election in 1999 through 2007. See Appendix C-3: Compliance Results for the 275 Early Election Units in 1998.

Average NO_x emission rates for Early Election units have declined by 17%, from 0.46 lb/mmBtu in 1990 to 0.38 lb/mmBtu in 1998. This decline is less dramatic than the decline at Phase I NO_x units because 51% of the Early Election units are newer units already subject to the New Source Performance Standards (NSPS) NO_x emission limits. The overall NO_x emission rate for these units is comparable to the average rate of 0.41 lb/mmBtu for all Phase I NO_x units. Exhibit 12 summarizes the NO_x emission rate reductions from 1990 to 1998 by boiler type for the 265 Early Election units that were operating in 1990.

[3] Compared with 1997, the universe of early election units remained the same, except for W C Dale Units 3 and 4 (KY) and H L Spurlock Unit 2 (KY), which were added after being inadvertently omitted in 1997.

Exhibit 12
Average NO_x Emission Rate for 265 Early Election Units (Operating in 1990)



NO_x Mass Emissions Reduction

The total NO_x mass emissions from the operating Early Election units increased by 106,619 tons (or 8 percent) from 1990[4] to 1998, reflecting an increase in utilization (see Exhibit 13). For the 265 Early Election units operating in 1990, heat input increased during the eight year period by approximately 28%.

[4] The 1990 NO_x mass emissions value differs slightly from the value in the 1997 NO_x Compliance report due to corrected estimates of heat input for ten units.

Exhibit 13
NO_x Mass Emissions for 265 Early Election Units (Operating in 1990)